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Fig.2(a)

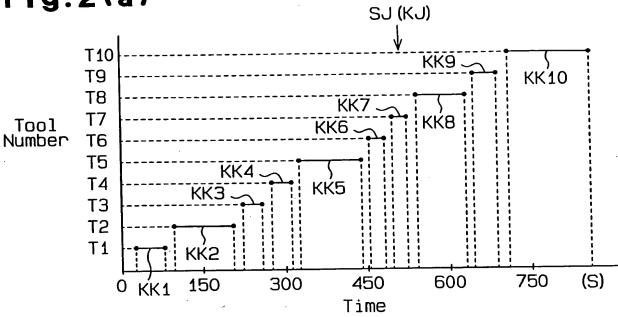


Fig.2(b)

STB J

Ordinal Number(i)	1	2	3	4
Tool Number	T2	T5	T8	T10

Fig.2(c)

VTB /

Tool Type	Drill	End Mill (Roughing)	Face Mill (Roughing)	End Mill (Finishing)	Face Mill (Finishing)
Sub-Routine Number	61	62	63	64	64

Fig.2(d)

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Tool Number	T1	T2	ТЗ	T4	T5	Т6	T7	T8	T9	T10
Maximum Spindle Load (%)	72	60	54	57	81	73	45	67	39	58
Cutting Speed (m/min)	45.9	40.8	124.0	87.5	100.4	72.1	53.4	110.9	120.0	80.0
Rotating Speed (min <sup>-1</sup> )										

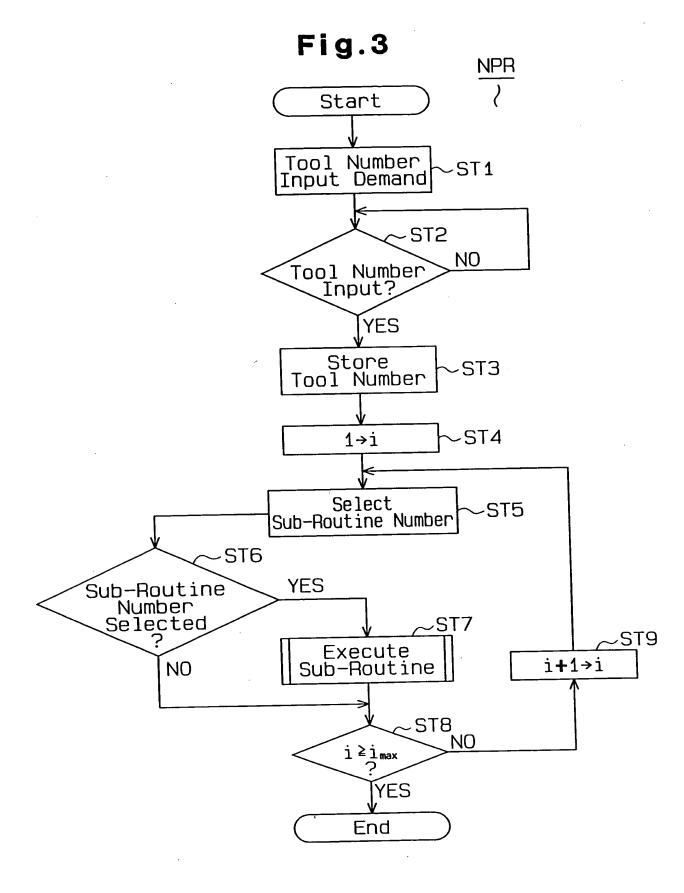


Fig.4

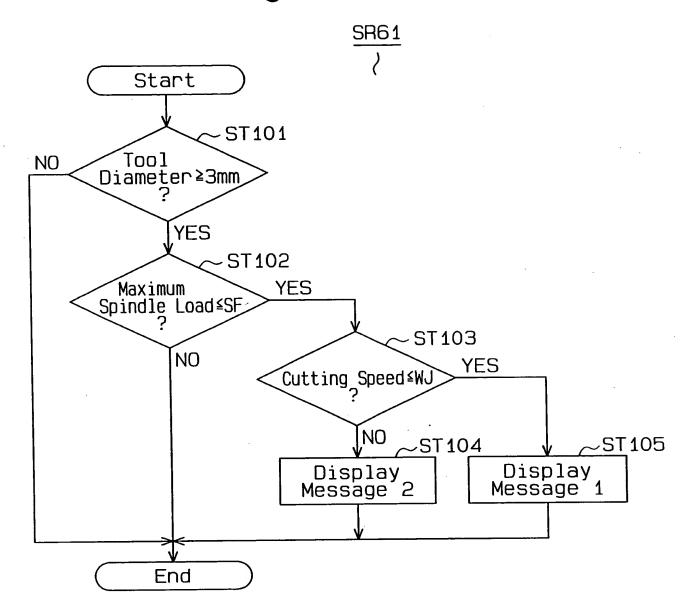
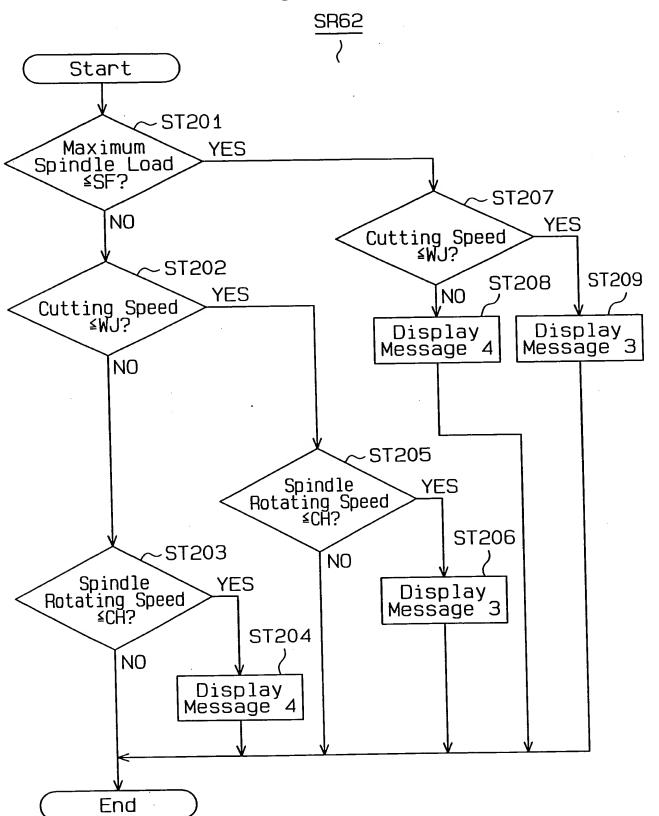


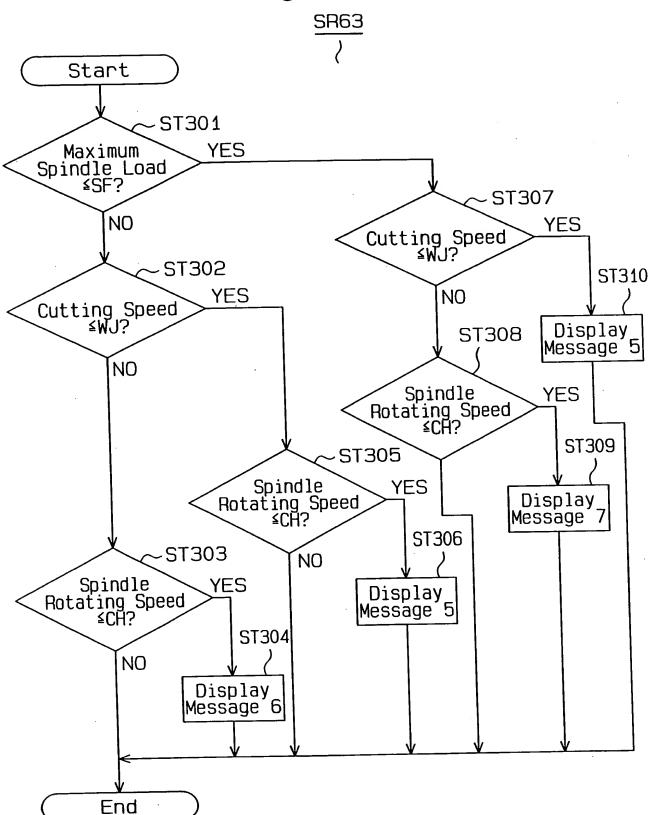
Fig.5



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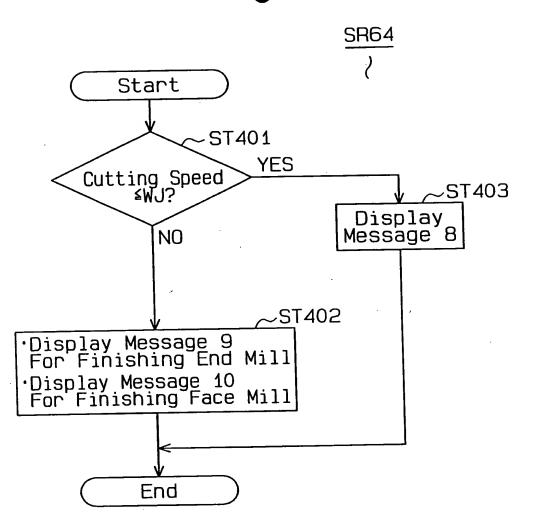
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Fig.6



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Fig.7







## Fig.8

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Navigation Information Number	Message (MSG)			
1	·Increase cutting speed to limit value			
2	·Change cutting tool meterial and increase cutting speed Change HSS tool (small diameter) to carbide tool Change HSS tool (large diameter) to throw away tool Change carbide tool to coolant through tool (for spindle through machines) Change carbide tool to carbide coating tool (for non-spindle through machines)			
3	·Increase cutting speed to limit value (fix cutting speed if cutting speed is equal to or higher than maximum spindle rotating speed)			
4	Change cutting tool meterial and increase cutting speed Change HSS tool (small diameter) to carbide tool Change HSS tool (large diameter) to throw away tool			
5	<ul> <li>Increase cutting speed to limit value</li> <li>(fix cutting speed if cutting speed is equal to or higher than maximum spindle rotating speed)</li> </ul>			
Change cutting tool meterial and increase cutting speed Change carbide tool to carbide coating tool (except when the workpiece material is AL)				
7	·Decrease tool diameter and increase rotating speed			
8	·Increase cutting speed to limit value (fix cutting speed if cutting speed is equal to) (or higher than maximum spindle rotating speed)			
9	·Change to tool with a larger teeth number and increase feed rate ·Change cutting tool meterial and increase cutting speed Change HSS tool to carbide tool Change carbide tool to carbide coating tool (except when the workpiece material is AL)			
10	·Change to tool with a larger teeth number and increase feed rate ·Change cutting tool meterial and increase cutting speed (except when workpiece material is AL) Change carbide tool to carbide coating tool or cermet tool Change carbide coating tool to cermet tool			



Fig.12

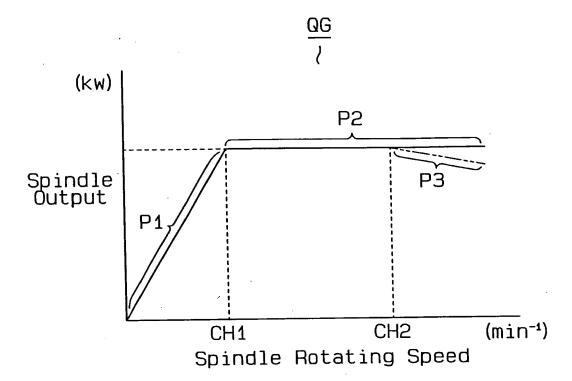




Fig.9(a)  $\frac{\text{SYF1}}{1}$ 

Workpiece Material	Basic Cutting Speed		
FC	30		
FCD	25		
S45C	30		
SCM	25		
SUS	15		
AL	75		
CU	75		
:	<u>:</u>		

Fig.10(a)  $\frac{\text{SYF2}}{l}$ 

	``
Workpiece Material	Basic Cutting Speed
FC	120
FCD	110
S45C	100
SCM	90
SUS	85
AL	700
CU	230
:	

Fig.11 (a)  $\frac{\text{SYF3}}{7}$ 

Workpiece Material	Basic Cutting Speed
FC FCD S45C SCM	140
	125
	200
	140
SUS	200
AL	1000
CU	300
:	•

Fig.9(b)  $\frac{SKF1}{J}$ 

Workpiece Material	Compensation Coefficient		-ta1
HSS	100		_ta2
Carbide	220		├ <b>~</b> ta3
HSS Coating	150		•
Coolant Through	460		1
Throw Away	560		
Brazed	240		1
•	•		
:	•		

Fig.10(b) SKF2

Workpiece Material	Compensation Coefficient	td1
HSS	25	td2
Carbide	100	td3
HSS Coating	30	] ] ]
Carbide Coating	110	] [ ]
Roughing	40	]  `\
Throw Away	150	111
:		<u> </u>
•	:	]

Fig.11 (b)  $\frac{SKF3}{J}$ 

	(	•
Workpiece Material	Compensation Coefficient	tf1
Carbide	100	tf2
Cermet	120	<b>-</b> tf3
Carbide Coating	115	<u> </u>
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